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FEDERAL COMMUNICATIONS COMMISSION
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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of

Replacement of Part 90 by Part 88 to
Revise the Private Land Mobile Radio
Services and Modify the Policies
Governing Them

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PR Docket No. 92-235

To: The Commission

COMMENTS OF THE E.F. JOHNSON COMPANY

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TABLE OF CONTENTS

	<u>Page</u>
I. INTRODUCTION	2
II. COMMENTS	3
A. The Commission's Proposals Should Reflect Marketplace Reality	3
B. The Commission Should Not Mandate the Use of Untested Technology	5
C. Trunking and Band Licensing Will Increase Spectrum Efficiency	6
D. FCC Major Proposals	7
1. Channel Spacing and Transition Periods .	7
2. Technical Standards, Channel Bandwidths and Spectrum Efficiency Standards	12
3. Emission Masks	14
4. Licensing of Channels (Shared, Exclusive, Exclusive Use Overlay and Innovative Shared Use	15
5. Private Land Mobile Radio Services . . .	18
6. Interservice Sharing of Frequencies in the 150-174, 421-430 and 450-470 MHz Bands	19
7. Transmitter Power/Antenna Height	20

SUMMARY

The E.F. Johnson Company supports the efforts of the Federal Communications Commission to increase the use of the spectrum allocated to the Private Land Mobile Radio Services. Many of the rules that govern the PLMRS are outdated and the technology employed by many PLMRS licensees is no longer current.

Nevertheless, the Commission should be cognizant of the significant investment in existing equipment in the land mobile industry. While new rules should be adopted that will require the employment of equipment different from that in use today in spectrum deficient markets, even in those areas, licensees should be able to continue to employ their equipment for the period of time they could reasonably expect it to be useful. Accordingly, E.F. Johnson recommends that no licensees be required to stop using or otherwise modify equipment until 2004, ten years from the time that this proceeding will likely terminate.

Similarly, the Commission should not prematurely require the industry to implement technology that has not yet been commercially tested and about which there remain technical questions. While the use of 12.5 kHz channelization is appropriate for near term use, the requirement to use either 6.25 or 5 kHz channelization is unrealistic today. The Commission should wait until 2004 until it mandates the use of either of those channelization schemes. Moreover, because it may be easier to implement 5 kHz channelization in the band 150-174 MHz, the Commission should defer until 2004 a determination of whether 5

or 6.25 kHz channelization is more appropriate in that spectrum.

The Commission should encourage the use of trunked technology. E.F. Johnson recommends, therefore, that the Commission reserve a segment of the spectrum in each service pool for trunked, band licensed operations. Used on a coordinated basis, this option will increase spectrum efficiency on shared channels. Trunking should also be required on individual shared and exclusive use channels (including exclusivity obtained through the exclusive use overlay procedure), when three or more are licensed to an entity.

E.F. Johnson supports the efforts of the Land Mobile Communications Council and the Consensus Plan it earlier submitted. In particular, it endorses, with minor modification, the recommended migration plan for UHF licensees. It offers a different proposal for the migration of users in the VHF band. E.F. Johnson supports LMCC's efforts to provide an administratively simpler method to determine permissible antenna and power combinations.

Finally, E.F. Johnson supports a reduction in the number of service pools. Efficiencies will be introduced by eliminating many of the existing categories. E.F. Johnson recommends, however, that the Commission use four licensing categories below 800 MHz. It also suggests that, except for 220 MHz, SMR operations be limited to the bands above 800 MHz.

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COMMENTS OF THE E.F. JOHNSON COMPANY

The E.F. Johnson Company ("E.F. Johnson"), by its attorneys, pursuant to Section 1.415 of the Rules and Regulations of the Federal Communications Commission ("FCC" or "Commission"), hereby submits its Comments responsive to the Notice of Proposed Rule Making ("Notice") adopted by the FCC in the above-referenced proceeding^{1/} in which the Commission proposes to adopt a new Part 88 of its Rules and Regulations which would govern the Private Land Mobile Radio Services ("PLMRS"). The new Part 88 would replace the existing Part 90. As a part of the conversion process, the Commission would amend some of the fundamental tenets of the existing regulatory structure.

^{1/} Notice of Proposed Rule Making, PR Docket No. 92-235, 7 FCC Rcd. 8105 (1992).

I. INTRODUCTION

E.F. Johnson is a leading designer and manufacturer of radio communication systems and specialty communication products for commercial and public safety use. Founded in 1923 as an electronic components manufacturer, E.F. Johnson entered the radio communications equipment market in the late 1940s and currently ranks among the three largest providers of land mobile radio systems in the United States. E.F. Johnson is one of the leaders in the SMR industry with a significant share of the domestic installed infrastructure and subscribed radio units. The company has established trunking protocols and open architecture standards with its clearchannel LTR®, a multichannel trunked radio product. In addition to its land mobile products, E.F. Johnson also offers an extensive line of electronic components manufactured to customer specification.

The conversion from Part 90 to Part 88 includes four fundamental changes to the existing PLMRS regulatory structure. First, the Commission proposes spectrum efficiency standards designed to permit an increased number of users in the PLMRS. That goal would generally be accomplished by ultimately reducing channel spacing to 6.25 kHz or less. Second, the Commission proposes a channel exclusivity option in the bands above 150 MHz. Frequency assignments would continue to be available, however, for traditional shared use of systems. Third, the Commission proposes to consolidate the current 19 radio services. Finally, the Commission would adopt new technical and operational

standards. Because E.F. Johnson is a major provider of private land mobile radio service equipment, and intends to continue to supply this equipment to licensees, it is pleased to have this opportunity to submit the following Comments.

II. COMMENTS

A. The Commission's Proposals Should Reflect Marketplace Reality

E.F. Johnson strongly supports the Commission's efforts to modernize the regulations that govern the PLMRS and to adopt rules which encourage the use of new, spectrum efficient technology. The current regulations, for example, do not envision trunking below 800 MHz. Yet, that technology has been employed successfully for many years in the 800/900 MHz bands and dramatically increases the efficiency of the spectrum. As discussed in greater detail below, E.F. Johnson strongly supports an increased ability to employ trunking and a requirement that licensees employ trunking when three or greater channels are in operation.

Similarly, the use of 25 and 30 kHz bandwidth equipment in the PLMRS is no longer reflective of the capabilities of current technology. While some communications requirements mandate the use of at least 25 or 30 kHz, there are many technologies which can be successfully employed today that use channels of 12.5 kHz or less. The Commission's rules should, therefore, encourage the use of narrower bandwidths, where possible, while preserving the

flexibility for entities to employ more spectrum if they demonstrate equivalent efficiency.

While E.F. Johnson is strongly supportive of the Commission's efforts in this proceeding, it is concerned that the Commission's initiatives do not accurately reflect, and are not sensitive to, marketplace investments. As the Commission is aware, there are billions of dollars of embedded equipment in operation in the bands below 800 MHz. Any regulations that are adopted must protect this investment.

Generally, users purchase equipment with an expectation that it will be in operation for a minimum of 10 years. Accordingly, presuming that the rules adopted in this proceeding are effective on or about January 1, 1994^{2/} the Commission should not adopt regulations which would ban the use of equipment currently in operation anytime before January 1, 2004. Users purchasing equipment today should be able to employ the equipment for its full useful life.

Similarly, the Commission should take no action in this proceeding which would require modification of existing equipment prior to January 1, 2004. The Commission proposes to require licensees to reduce their occupied bandwidth by 1996. A requirement for modification of millions of transmitter units is unrealistic. The public would be better served if, instead of

^{2/} Throughout these Comments, E.F. Johnson assumes an effective date of the new regulations of January 1, 1994. Any delay in Commission action would necessitate modification of E.F. Johnson's recommendations.

requiring change of existing equipment, current facilities could continue in operation for their entire useful life. In 2004, users would have the option of modifying their equipment, if possible, to conform with the new technical standards. In the alternative, they would be required to purchase new equipment. However, by that time, they will have had an opportunity to recoup the costs of their investment.

**B. The Commission Should Not Mandate
the Use of Untested Technology**

The Commission's proposals envision rechannelization of the bands below 800 MHz to employ equipment using 6.25 kHz or 5 kHz equipment. E.F. Johnson believes it is premature to adopt regulations which will require the use of these narrowband technologies. E.F. Johnson is committed to intensive research and development efforts that will allow it to produce the most spectrum efficient technology possible at reasonable cost. Ultimately, that technology may be the use of 5 or 6.25 kHz equipment. However, the employment of equipment using channelization of 6.25 or 5 kHz is largely untested today. In the bands 220-222 MHz, the Commission requires the use of equipment employing 5 kHz channelization. Within the next several years, E.F. Johnson expects that several manufacturers will make available, and users will employ, equipment using 5 kHz channels. At that time, it will be appropriate for the Commission to revisit whether it should mandate the use of more narrowband equipment and how narrow the bandwidth may usefully

be. Until then, however, the requirement to shift to the use of this channelization scheme is premature.^{3/}

There are other sound reasons to delay a requirement to employ narrowband equipment. Digital technology is about to be employed in the 800 MHz bands and may ultimately be used in the 900 MHz bands, as well as other PLMRS bands. It is uncertain how much additional capacity will be created from this conversion to digital technology. Should sufficient capacity be available through the digitalization process, it would be uneconomic to require a transition to narrower bandwidths.

C. Trunking and Band Licensing Will Increase Spectrum Efficiency

As described more fully below, E.F. Johnson believes the Commission should increase opportunities for trunking and band licensing. By arraying the frequencies available for a particular radio service in a "block fashion", the Commission can promote both concepts.^{4/} Trunking could be employed effectively by reserving a portion of the frequencies in each pool for band licensed, shared channel, trunked operations. By issuing an authorization for a band of shared frequencies, the

^{3/} As noted below, E.F. Johnson does not object to the adoption of regulations which would allow, on a voluntary basis, employment of equipment using 6.25 or 5 kHz channelization.

^{4/} To the extent that the current allocation scheme does not allow "block" allocations, the Commission could make minor modifications effective January 1, 2004 by which time all users, unless they elected to operate on a secondary basis, would be required to purchase new equipment.

Commission could increase the number of users effectively employing the band. Users could also be authorized for more than one shared channel that is not part of the "band licensed" segment. However, any user who demonstrated a requirement for the use of three or more individual shared channels, would be required to employ trunked facilities. Finally, any entities that were able to obtain exclusive use of channels, either through new licensing or exclusive use overlay ("EUO"), should be required to employ trunking if they propose the use of three or more frequency assignments. The use of band licensed, trunked shared use channels and trunked exclusive use channels will present licensees with a variety of options, depending upon their requirements. These recommendations are addressed more completely below.

D. FCC Major Proposals^{5/}

1. Channel Spacing and Transition Periods

The Commission proposes to reduce channel spacing in the 72-76 MHz and 150-174 MHz bands to 5 kHz. In the 421-430 MHz, 450-470 MHz and 470-512 MHz bands the Commission proposes to reduce the channel bandwidth to 6.25 kHz. The Commission proposes a transition period in order to reach this goal. It would require existing users to reduce transmitting frequency deviation at 420-512 MHz to 10 kHz by January 1, 1996. By reducing deviation, the

^{5/} The remainder of E.F. Johnson's Comments follow generally the structure contained in Appendix A of the Notice.

Commission would create three channels from every existing channel. A 12.5 kHz channel would be centered on the original channel's center frequency and could be licensed to all existing users. The other two channels would be 6.25 kHz wide spaced just above and below the 12.5 kHz channel and would be available to new users.

At 150-174 MHz, the Commission proposes to require existing users to reduce occupied bandwidths to 12 kHz by January 1, 1996. According to the Commission, this would reduce adjacent channel noise and permit it to eliminate adjacent channel mileage separations. It also proposes to require licensees in the 150-174 MHz band to ultimately employ 5 kHz equipment. The new 5 kHz channels would be centered at the existing channels, plus 5 kHz above and below the current channel centers. Some of the newly created channels would be designated for innovative shared use operations.^{6/}

As noted above, E.F. Johnson does not believe the Commission should, at this time, require a move to 6.25 kHz or any other narrowband technology on a mandatory basis. With respect to the 470-512 MHz band, it supports the Consensus Plan proposed by the Land Mobile Communications Council ("LMCC"). LMCC recommends that effective January 1, 1994 licensees have the opportunity to employ true 12.5 kHz bandwidths on a voluntary basis. At the same time the Commission would adopt a 6.25 kHz channelization

^{6/} E.F. Johnson's Comments do not address the 72-76 MHz band. E.F. Johnson does not currently manufacture equipment which employs that spectrum.

plan which could be used on a voluntary basis for those entities wishing to employ narrowband equipment. Concurrently, according to LMCC, the Commission would designate a percentage of the current offset channel pairs as primary, site-specific channels usable on the same basis as any other channels in the 450-470 MHz band. Offset channels not designated for primary, site specific operations would remain available for low power itinerant use.

As discussed above, E.F. Johnson differs only slightly from LMCC's approach to designation of channels for lower power, itinerant operations. It recommends that a segment of the current offset channels as well as other adjacent contiguous channels be designated for shared trunked, band licensed use. This would require rechannelization of some current offset channels. Current users would be protected until January 1, 2004, or later, if they chose to operate on a secondary basis. These new assignments would be available on a band-licensing basis for all users sharing the band.

As of January 1, 1996, according to LMCC, the Commission would begin to license full power operations, based on frequency coordination, on the current offset channels that were then designated for primary operations. E.F. Johnson agrees this process should begin as soon as possible. At the same time, the Commission would only accept applications for type approval for equipment capable of operating on 12.5 kHz channels. Existing users would not be required to change or modify their equipment, until January 1, 2004. As LMCC recommends, licensees could

continue to operate with existing equipment, after that time, but on a secondary basis only. E.F. Johnson agrees that it is inefficient to require users to stop employing equipment in, for example, rural areas, where there is unlikely to be any competing use of the frequencies by entities employing new 12.5 kHz equipment.

Finally, with respect to the 470-512 MHz band, LMCC recommends that by January, 1999, the Commission commence an additional rule making proceeding to examine whether to require licensees to convert to 6.25 kHz channels by January 1, 2014. While E.F. Johnson supports this proposal, it urges the Commission to seriously evaluate whether it will ultimately be necessary to impose 6.25 kHz channelization. E.F. Johnson questions whether the Commission need include in the regulations a requirement to initiate a subsequent rule making, given that a 6.25 kHz channelization plan will be in place. E.F. Johnson is confident that should sound engineering practices support the movement to 6.25 kHz channelization at a reasonable cost, the Commission could easily and quickly initiate a rule making proceeding designed to require use of the new technology.

At 150-174 MHz, LMCC presents two proposals. As LMCC points out, the current channelization scheme does not lend itself to 12.5 or 6.25 kHz channelization, which is the preferred migration pattern. Because E.F. Johnson Company does not believe that the rules should necessarily incorporate a plan for either 6.25 kHz or 5 kHz channelization today, it urges the Commission to

withhold a decision on the most effective method of channelization for ten additional years.

If, after evaluation of the experience gained at 220-222 MHz, the Commission determines that communications requirements can be effectively met with 5 kHz equipment, it can implement a band plan employing 5 kHz channels. Because today the channels are 30 kHz wide (albeit interweaved 15 kHz apart), 5 kHz channel spacing would be both more spectrum efficient and easier to implement.

If however, after evaluation of the use of 220-222 MHz band, the Commission determines that 5 kHz equipment is not meeting communications requirements, the Commission should implement a 6.25 kHz band plan. The conversion to 6.25 channelization would be more difficult because it will require shifts from existing channel centers. Nonetheless, if 5 kHz channelization is not viable, the use of 6.25 kHz channelization would be appropriate. However, the Commission and the industry will not be in a position to make this determination for another ten years.

Accordingly, E.F. Johnson recommends that the FCC modify the regulations to provide that it initiate a rule making proceeding, to be completed by no later than January 1, 2004, to determine whether to employ 6.25 kHz or 5 kHz channelization in the band 150-174 MHz. At that time, the Commission would implement a channeling and migration plan so that by January 1, 2014, only narrowband users will be protected on a primary basis on those channels. Under E.F. Johnson's proposal:

- Effective January 1, 2004, licensees on full power channels would have the option of employing true 6.25

agrees with the occupied bandwidth proposed for 12.5 kHz channelization. Because E.F. Johnson believes that the ultimate use of 6.25 or 5 kHz channelization should be revisited in another rule making proceeding, it urges the Commission to indicate that these occupied bandwidth rules are transitional only and are subject to revision in a further rule making.

New Section 88.433(d) of the regulations addresses spectrum efficiency standards. It states, for example, that for the bands 420-512 MHz, the proposed technology must permit one communications link per 6.25 kHz. In the top 15 markets, users would be required to meet the standard by 2004. Because E.F. Johnson proposes use of a 12.5 kHz channelization scheme for the UHF bands, it believes that the spectrum efficiency standards for those bands should be one communications link per 12.5 kHz. There is no reason why, for maximum technical flexibility, that entities employing equipment using non-standard bandwidths should be held to a higher spectrum efficiency standard than those employing the standard bandwidth. Because E.F. Johnson recommends that the spectrum efficiency standard remain at 12.5 kHz, at least until 2004, one communications link per 12.5 kHz should be the benchmark until that point. Thereafter, the equivalent efficiency should correspond to the channelization scheme in place.

3. Emission Masks

The Commission proposes two emission masks. One is based on 5 kHz channel spacing and the other on 6.25 kHz spacing. The masks are designed to provide 40 dB of attenuation at the edge of the authorized channel, 50 dB of attenuation at the edge of the authorized bandwidth of the adjacent channel, and 65 dB of attenuation thereafter.

E.F. Johnson worked with TIA in the development of emission masks for narrowband transmissions in support of APCO Project 25. E.F. Johnson supports TIA's position on emission masks and encourages the Commission to adopt those recommendations for 12.5 kHz and 6.25 kHz channelization. E.F. Johnson recognizes that APCO Project 25 is concerned with digital modulation. However, the emission masks developed in connection with that effort may be used for both analog and digital modulation. TIA's work would allow the employment of its developed emission mask standards for 12.5 kHz channels and for future migration to 6.25 kHz channels. As with other technical standards, once 6.25 or 5 kHz channelization is studied further, the appropriate emission masks may require revision.^{1/}

^{1/} To the extent 5 kHz channelization is employed at 150-174 MHz, a separate emission mask standard might be developed in the future.

4. Licensing of Channels (Shared, Exclusive, Exclusive Use Overlay and Innovative Shared Use

The Commission proposes to license some channels on a shared basis only and make other channels available for exclusive licensing under specified circumstances. The Commission also recommends setting aside certain channels for innovative shared use. E.F. Johnson supports the availability of channels on both an exclusive and shared use basis. However, it does not support the Commission's innovative shared use proposal.

E.F. Johnson supports the use of shared and exclusive channels. Some licensees do not require exclusive use of frequency assignments. Accordingly, E.F. Johnson recommends designation of channels for use on a shared, band licensed basis. Other single channels could be shared or converted to exclusive use, through the EUO procedure after coordination. As noted above, the Commission would incorporate a system of allocation, under which, within each frequency pool (as it may be defined) blocks of channels are designated for shared band licensed use, while other blocks are designated for channel-by-channel exclusive or shared operations.

In addition to its proposal to designate channels for shared use, the Commission proposes that five licenses in each of seven regional markets be designated for a new type of shared use radio operation. E.F. Johnson opposes the Commission's innovative shared use proposal. E.F. Johnson agrees with LMCC that adoption of the proposal would not be in the public interest. E.F. Johnson agrees that the channels will be used more effectively

with traditional and advancing technology (e.g., trunked, digital, and TDMA) land mobile systems.^{8/} Also, as LMCC points out, the innovative shared use plan would "make it impossible to group together three or more adjacent channels that may be necessary to operate spectrally efficient digital systems requiring relatively wider channels."^{9/}

The Commission proposes to allow applicants and licensees to convert currently shared use channels and new channels to exclusive use if their loading justifies. To convert currently shared use channels to exclusive use, it proposes a marketplace mechanism, designated exclusive use overlay ("EUO"), that will provide applicants/licensees the opportunity to obtain exclusive use of channels below 470 MHz. E.F. Johnson generally agrees with the proposed Section 88.179 of the regulations concerning the conversion of shared use channels to exclusive channels. It also agrees with the Commission's proposals concerning loading criteria and the mechanisms by which an applicant can secure an EUO.

However, E.F. Johnson disagrees with the Commission's designation of a 50-mile radius as an appropriate range for securing an EUO authorization. There will be many users who require less than a 50-mile service area. For example, in factories and other campus-like settings, coverage of 10-20 miles might be appropriate. If an applicant can demonstrate that it

^{8/} LMCC Consensus Plan at p. 24.

^{9/} Id.

will not cause harmful interference outside of its legitimate service area or if it receives concurrence from others operating on the frequencies within that service area, it should be permitted to obtain an EUO license for those channels. It should be the responsibility of the frequency coordinators to ensure that EUO licensees cover the smallest area possible to meet licensees' communications requirements.

Similarly, EUO licenses should be available for a broader area than a 50- mile radius, if that area can be served by a single transmitter site and if the appropriate concurrence and loading criteria are met. In locations where the propagation characteristics permit and service requirements dictate, applicants should be permitted to cover a broader area than the 50 miles specified in the regulations.

The general loading criteria address only single-site systems. The Commission proposes different regulations for EUO-wide area systems. Wide area EUO licenses will be granted based upon an evaluation of the number of frequencies requested and the number of transmitter units in use. E.F. Johnson supports this concept but urges that the standard be consistent with that employed for SMR licenses. E.F. Johnson is cognizant that the Commission's pending proceeding concerning wide area systems for SMRs may supersede the current criteria for wide area authorizations^{10/} and urges the Commission to employ a consistent approach.

^{10/} P.R. Docket No. 93-144, see News Release issued May 13, 1993.

5. Private Land Mobile Radio Services

The Commission proposes to either consolidate the existing radio services into three broad categories plus a general category pool, or retain the current radio service categories and assign to those services their existing frequency assignments, but assign all new channels to the proposed three broad categories in the general category pool. F.F. Johnson supports

the channels would approximate the approach currently used above 800 MHz.^{12/} Below 800 MHz there would, however, be no SMR category channels (except for those designated in the 220 MHz band). Moreover, there would be no channels designated for general category use.

6. Interservice Sharing of Frequencies in the 150-174, 421-430 and 450-470 MHz Bands


The Commission proposes that SMRs be provided with limited entry to what it characterizes as non-commercial radio service channels. It would limit SMRs to reassignment of channels licensed and operated by long-standing bona fide non-commercial or public safety licensees. E.F. Johnson disagrees with this approach. Because of the digitalization of 800 MHz SMR systems, the release of additional 900 MHz channels for SMR purposes and the current licensing of 220 MHz channels for SMR systems, it is unclear that additional capacity is required for SMR systems in the bands below 800 MHz (other than 220 MHz). These channels should remain available for non-SMR operations. In the alternative, E.F. Johnson recommends an intermediate ban on interservice sharing. As in the 900 MHz spectrum, the Commission

^{12/} Below 800 MHz, there would be a separate land transportation category which does not exist above 800 MHz. Because of intense use of land transportation channels in major metropolitan areas, separation of these users from other entities is warranted. Moreover, for this pool, a higher percentage of shared, band licensed trunked channels may be appropriate.

should impose a temporary prohibition on interservice sharing between SMR and non-SMR categories.

7. Transmitter Power/Antenna Height

In the 150-174 MHz and 450-470 MHz bands, the Commission proposes a maximum authorized transmitting effective radiated power ("ERP") of 300 watts for stations with an antenna height above average terrain ("HAAT") of up to 60 meters (197 feet), with power reductions for increasing antenna heights. E.F. Johnson believes that the Commission's approach is overly complicated. It favors, instead, the recommendation of LMCC. Specifically, E.F. Johnson supports the LMCC "safe harbor" table of permissible power/height combinations which is premised on: (1) the HAAT of the applicant's antenna; and (2) the applicant's required service area radius. As LMCC points out, by using the tables, an applicant can easily determine the maximum permissible ERP and HAAT combination for any desired service radius between two and 60 miles. If an applicant's power/height combination meets the limits of the table, no further demonstration would be required. Applicants requiring power or height in excess of that provided by the table would be able to submit coverage contours. As LMCC states, the tables could also be modified or enhanced to accommodate even more flexible FNO procedures.



that the frequency coordinators will be primarily responsible for reviewing an applicant's request for system power/height combinations, whether under the "safe harbor" table or through submission of coverage predictions. Coordinators should have the ability to request additional information necessary for the processing and coordination of an application. It is through the receipt of this information that systems can be most accurately "engineered in" to permit the greatest use of the frequency assignments in the greatest number of geographic areas.

8. Co-Primary 450 MHz Offset Channels

The Commission proposes that ten 450-470 MHz offset channel pairs currently available only in the Special Industrial Radio Service remain available on a primary basis. As noted above, E.F. Johnson recommends that the Commission designate a percentage of the channels in each pool for shared, band licensed, trunked operations. These channels would be grouped together, in order to support trunked operation. This option will present a low cost alternative to many entities.

9. Extended Implementation

The Commission proposes expanding the extended implementation option for primarily public safety systems above 800 MHz to all bands and to any type of licensee provided they can show cause. The Commission has recently, in the Docket No. 92-210 proceeding, expanded the eligibility for extended